

REMARKS

Claims 1 and 3-8 are now pending in the application. Claim 1 is amended herein. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 103

Claims 1, 2 and 6 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 08-236,908 in combination with Speakman (U.S. Pat. No. 6,503,831) alone or further in combination with Nagano et al. (U.S. Pat. No. 5,795,794). This rejection is respectfully traversed. Notwithstanding and solely in the interest of expediting prosecution, Applicant amends claim 1.

Amended claim 1 calls for a manufacturing method of a multilayer circuit board, comprising the step of forming at least two wiring layers, an inter-layer insulating film provided between every adjacent two of the wiring layers, and conductive posts for providing electrical conductivity between the wiring layers, wherein: said step includes forming the inter-layer insulating film by changing the film thickness of the inter-layer insulating film according to a concavo-convex shape of an area where the inter-layer insulating film is formed, so as to level an upper surface of the inter-layer insulating film, wherein the inter-layer insulating film is formed by using a droplet jetting method and the formation of the inter-layer insulating film includes at least a first step of forming an inter-layer insulating film whose film thickness is changed so as to completely fill concave portions in the concavo-convex shape with the insulating film *through a single ink-jetting operation over the area where the inter-layer insulating film is formed.*

In the method disclosed in JP 08-236,908, liquid photosensitive resin 3 is deposited by means of an electrostatic method on areas where no conductive patterns 2 are formed. Therefore, as shown in part (b) in Fig. 1, the top face after the deposition is not even, and V-shaped gaps are formed as can be seen in a sectional view at each boundary between the liquid photosensitive resin 3 and the conductive patterns 2. In order to fill up the gaps, an additional process of depositing the liquid photosensitive resin 3 is provided. However, when this process is performed using spray coating or the like, the top face is still not uniformly even (against part (c) in Fig. 2).

In contrast, the claimed invention includes forming the inter-layer insulating film by changing the film thickness of the inter-layer insulating film according to a concavo-convex shape of an area where the inter-layer insulating film is formed, wherein there is the first step in which the concave portions are completely filled through a single ink-jetting operation over the area where the inter-layer insulating film is formed. Therefore, a flat surface can be produced through a single operation or process over the target area.

JP 08-236908 does not disclose or suggest such changing of the film thickness according to a concavo-convex shape, and obtains a surface which is arguably flat to some degree by repeating a coating operation a few times. Furthermore, by repeating the depositing the liquid photosensitive resin 3, the insulating layer for filling the concave portions has a height that is larger than the depth of the original concave portions, thereby increasing the width of the insulating layer. This is undesired.

As described above, in the claimed invention in which the inter-layer insulating film is formed by changing the film thickness according to a concavo-convex shape in

6,503,831) alone or further in combination with Nagano et al. (U.S. Pat. No. 5,795,794) still further in combination with JP10-221,698 and JP 11-163,499. This rejection is respectfully traversed. Claims 3-5, 7 and 8 depend from claim 1 and should be in condition for allowance for at least the same reasons as set forth above.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action and the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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the target area, a flat inter-layer insulating film whose height corresponds to the depth of the concave portions can be formed by a single ink-jetting operation over the target area. Therefore, the inter-layer insulating film can be most efficiently formed without producing waste.

In the method disclosed by Nagano et al., a first dielectric film 7 is covered with a second dielectric film 8 which has a film thickness greater than the difference in the level between the top and bottom of the surface of the first dielectric film 7. As clearly shown by the drawings, the second dielectric film 8 is not a film whose thickness is varied, and thus has a shape following the concavo-convex shape of the first dielectric film 7. Therefore, the surface of the second dielectric film 8 also follows the concavo-convex shape of the first dielectric film 7, and thus is not flat.

Speakman, which has been referred to in some previous Office Actions, also does not disclose forming an inter-layer insulating film by changing the film thickness of the inter-layer insulating film according to a concavo-convex shape of an area where the inter-layer insulating film is formed.

Accordingly, even if JP 08-236,908 is combined with Speakman and Nagano, the combination does not yield the claimed invention. As such, the combination cannot render claims 1, 2 or 6 obvious.

In view of the foregoing, reconsideration and withdrawal of this rejection are respectfully requested.

Claims 3-5, 7 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over JP 08-236,908 in combination with Speakman (U.S. Pat. No.